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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/707,811

01/14/2004

Jeffrey P. Gambino

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06/22/2004

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EXAMINER

GURLEY, LYNNE ANN

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 06/22/2004

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3

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/707,811

Applicant(s)

GAMBINO ET AL.

Examiner

Lynne A. Gurley

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 May 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 19-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 January 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119


- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/14/04.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.


LYNNE A. GURLEY
PRIMARY PATENT EXAMINER
TC 2800, AU 2812

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1-18 in the reply filed on 5/25/04 is acknowledged.
2. Claims 19-24 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 5/25/04.

Drawings

3. New corrected drawings are required in this application because the drawings are informal -- the lines are not clear and, the reference numbers are drawn by hand. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Specification

4. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

5. Claim 9 is objected to because of the following informalities: the words "of claim" are missing before the number "8". Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-5, 10-16 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Lou (US 6,492,270, dated 12/10/02).

8. Lou shows the method as claimed in figures 2a-2i and corresponding text as providing a lower metal wiring layer having first metal lines 210 (column 5, lines 17-20) located within a lower low-k dielectric 240 (column 5, lines 43-61); depositing an upper low-k dielectric 260 (column 65-67; column 6, lines 1-13) atop said lower metal wiring layer; etching at least one portion of said upper low-k dielectric to provide at least one via to said first metal lines (fig. 2d; column 6, lines 13-16; column 7, lines 30-43, with emphasis on lines 34-38, for forming a single damascene opening -- a single via or a single trench in which the spacer is formed since the process may be used for single or dual damascene interconnects); forming rigid dielectric sidewall spacers 300 (conformal SiN, 150-500 Angstroms thick, which is etched to form sidewall spacers) in said at least one via of said upper low-k dielectric; and forming second metal lines 310/330 in said at least one portion of said upper low-k dielectric. Note that the figures are

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described for showing only a portion of the substrate and consequently only one interconnect, however the method is for fabricating a plurality of such interconnects (abstract, lines 1-2; column 1, lines 30-35; column 3, lines 56-57; column 4, lines 39-41). The low-k dielectric layers may be low-k SiO₂ (i.e., fluorinated SiO₂) or SiN or low-k polymers (column 5, lines 43-60), since these layers are within Applicant's disclosed materials, it is considered inherent that they are within the claimed dielectric constant range. A rigid insulating layer (SiN etch stop 250) is deposited above the lower low-k dielectric.

9. In claim 10, Lou shows the above, with the additional part of the lower low-k dielectric (doped SiO₂) which covers the top of the first metal lines being considered as the mechanically rigid dielectric atop the lower metal wiring layer (claims 10-12). The first metal lines comprise copper and aluminum .

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 6-9 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lou (US 6,492,270, dated 12/10/02).

Lou shows the method substantially as claimed and as described in the preceding paragraphs.

Lou lacks anticipation only in not teaching that: 1) the method of deposition for the conformal rigid dielectric liner (for the spacers), an anisotropic etch for the same; and, 2) the low-k carbon doped oxide is SiCOH.

It would have been obvious to one of ordinary skill in the art to have had the conformal rigid dielectric liner for the spacers, in the method of Lou, to be deposited by one of the claimed methods, with the motivation that Lou discloses the claimed deposition methods for a similar thickness in the SiN etch stop layer (column 5, lines 63-65).

It would have been obvious to one of ordinary skill in the art to have used an anisotropic etch to form the spacers in the method of Lou, with the motivation that, conventionally, this etch method produces the desired rounded spacers as shown in Lou.

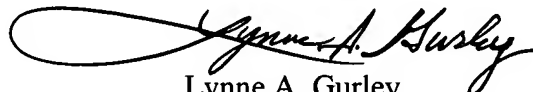
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It would have been obvious to one of ordinary skill in the art to have used SiCOH for the low-k carbon doped oxide, in the method of Lou, with the motivation that SiCOH is also a known low-k dielectric, and Lou's method does not hold impartiality with respect to carbon-doped layers and polymers (column 5, lines 54-60).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne A. Gurley whose telephone number is 571-272-1670. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on 571-272-1679. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Lynne A. Gurley
Primary Patent Examiner
TC 2800, AU 2812

LAG
June 19, 2004